

FIELD APPLICATIONS™

Rocky
Mountain
Oilfield
Testing
Center

HYDRO-BALANCED STUFFING BOX

Reduces Environmental Risk and Polished Rod Wear

Product Developer: *The Palmour Group*

► THE PROBLEM

Environmental contamination is a primary concern for all producers. Spills and leaks of produced well fluids can cause soil contamination resulting in costly cleanup. When produced oil or gas is lost through leaks or spills it is lost production. If these conditions persist, undetected, they can severely impact the economics of producing wells.

Operations in marginal fields often are monitored infrequently or pumping units are located in remote areas not easily observed. Operators desire durable and reliable field equipment which offers ease of maintenance and reduced operating costs.

Leaks or spills are often the result of stuffing box seal wear, worn packing, or rod friction.

► THE SOLUTION

The Palmour Group of Livingston, Texas has developed the Hydro-Balanced Stuffing Box designed to solve many of the problems associated with spills and leaks around the polished rod in oil and gas pumping well installations. The stuffing box is designed to reduce the incidence of seal leakage, and to utilize an environmentally safe fluid, so that if there is any leakage environmental damage is reduced or eliminated.

The stuffing box assembly consists of a primary seal and a secondary seal separated by an environmentally safe fluid-filled middle chamber. The primary seal separates the inner chamber from the atmosphere while the secondary seal separates the inner chamber from the well fluids being pumped to surface in the tubing. The sacrificial fluid is stored in a reservoir and transmitted to the inner chamber through a pressure transmitter and a check valve assembly.

The unique lubrication system allows the polished rod to operate at a lower temperature, extending the life of the packing elements, and reducing the energy demand for the pump motor.

► THE BENEFIT

The Hydro-Balanced Stuffing Box may be adapted to any make, model, or design of stuffing box already on a pumping well by using a field retrofit assembly, eliminating the need of having to buy a complete stuffing box.

- If any fluid is leaked to the environment, it will be environmentally safe fluid.
- The lubricated seals operate at lower temperatures and cause less wear, extending the life of the polished rod and packing.
- Energy costs will be reduced through reduced internal friction between the polished rod and the packing.

- Eliminates the potential cost of environmental clean-up from leaks and spills.
- Eliminates lost revenues from lost oil and gas production.

► THE FIELD PERFORMANCE

Two prototype units were installed on rod-pumped stripper wells. Both wells produce with a time clock and have a history of packing element wear and stuffing box leaks. A Barton two-pen recorder with two static pressure transducers was used to monitor the pressure on either side of the secondary seal. Safe fluid levels and fluid usage were monitored.

On August 26 and 27, 1999 both stuffing box units were installed by a Trico Weatherford representative according to recommended procedure. The grease version was installed on Well 62AX3, the oil version on Well 12AX11.

The units were operated from late August until mid-November to familiarize the technicians with the performance while the test instrumentation was being assembled. When the fluid monitoring equipment was installed on October 1, only minor wear was observed on the secondary packing. By mid-November, the test instrumentation to be performing well and the 60 day monitoring period began.

During the test period, Well 62AX3 experienced a flowline plug

from paraffin causing the tubing pressure to rise from 16 psi to approximately 73 psi. The middle chamber pressure also rose. During the event, a half tube of grease was used and about three pumps were noticed on the top of the stuffing box. This amount of leakage was considered small compared to what would have been expected from a conventional stuffing box.

Extremely cold weather during the test period caused both of the wells to freeze. Although production was down several days, there was no effect on the grease stuffing box. When the well was returned to production, the middle chamber pressure was maintained above the tubing pressure. This is thought to be a function of the tightness of the primary packing. Low temperature grease was used. The polished rod temperature held constant at 50° F, while the well was pumping.

When the well with the oil stuffing box was restarted, there was a considerable loss of fluid on top of the box and into the well fluids until the polished rod warmed up to its operating temperature of 50° F. The upper and lower packing elements were tightened but not before seven inches of fluid was lost. The well operated for 8 hours before freezing again. When the well was restarted the following day, there was no further fluid leakage.

The tests indicate that when the

Hydro-Balanced Stuffing Box is installed and adjusted properly, it is capable of significantly reducing the spillage of well fluids from the stuffing box for rod pumped wells, compared to the conventional stuffing box design. It is important to tighten the packing elements correctly. This prevents loss of safe fluid from the inner chamber to either the environment or to the well fluids below. Tightening the primary packing correctly also helps to maintain the inner chamber pressure above the tubing pressure for proper stuffing box operation.

► THE NEXT STEP

It is recommended that the manufacturer develop better procedures for tightening the packing elements. This is a critical part of the proper operation of the stuffing box. To provide for more tightening as the packing mechanism wear, additional travel in the tightening bolts would be beneficial, along with etched or engraved markings to allow for equal tightening of the belts.

The Hydro-Balanced Stuffing Box is manufactured by The Palmour Group, now part of Weatherford Artificial Lift Systems of Houston, Texas.

► FOR MORE INFORMATION:

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